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Union Wage Differentials in Great Britain: Recognition or Membership?

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DISCUSSION PAPER

Union Wage Differentials in Great Britain: Recognition or Membership ? *

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Abstract

This paper presents estimates of union wage differentials and explores to what extent they are affected by the degree of unionisation. For this purpose, data at the individual level obtained from the British Household Panel Survey (BHPS) are used. Our results support the hypothesis that the union wage premium is mainly a recognition premium. For the period 1995-1997 our estimate of the recognition premium is about 4%. This result takes into account unobserved worker heterogeneity and is obtained by using a more efficient panel data estimator compared to earlier studies.

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1 Introduction

This paper presents estimates of the membership premium and the recognition premium for Great Britain using panel data on an individual level. We define the membership premium as the wage premium that members receive in comparison with non-members *within* a workplace where a wage agreement is present. The wage premium of workers in a workplace with a wage agreement compared to workers in a workplace without such an agreement is referred to as the recognition premium.[1] So far, few papers exist for Great Britain that adopt both an individual panel data approach and distinguish between union membership and union recognition (Swaffield (1999) and Hildreth (1999),(2000)).[2]

Swaffield (1999) and Hildreth (1999) present significant evidence for the existence of a recognition premium for female workers, but not for male workers. Hildreth (2000) did not find a significant robust estimate for the recognition premium using a sample of both male and female workers.[3] These results are somewhat puzzling given that in Great Britain the decision to recognise a union is taken by the employer on a voluntary basis. Therefore, there is no *a priori* reason to expect differences between male and female workers for the recognition premium. Moreover, it is hard to believe that there does not exist a recognition premium in Great Britain given cross-sectional evidence as in Blanchflower (1991), Blackaby, Murphy and Sloane (1991), Blackaby, Murphy and O´Leary (1999), Swaffield (1999) and Hildreth ((1999),(2000)). In addition, Millward, Bryson and Forth (2000) present survey evidence on the establishment level from the Workplace Industrial Relations Survey (WIRS) that indicates that in

[1] It is important to identify which workers can benefit from a wage agreement in a workplace. For the US in so-called Right-to-Work states unions that negotiate with employers are required by law to act on behalf of all workers. Workers on their part are free in their decision to become a union member or not. In contrast, employers in Great Britain recognise unions for the purpose of bargaining on a voluntary basis. Even if a majority of the workers is in favor of recognition, the employer is not obliged to recognise a union. Similarly, workers are free in their decision to join a union.

[2] Early papers that distinguish between the two types of union status and use cross-sectional analysis techniques are: Green (1988), Blanchflower (1991) and Blackaby, Murphy and Sloane (1991). Recent papers are Andrews, Stewart, Swaffield and Upward (1998), Blackaby, Murphy and O'Leary (1999).

[3] All studies do take into account the presence of a potential unobserved individual effect correlated with union status.

1998 on average 69% of the employees working in a workplace with a recognised union were covered by collective bargaining. They further found a union membership density in such workplaces of 56%. These figures are even higher for 1990 (81% and 68% respectively).[4]

The strongest indication for the existence of a recognition premium is provided by Booth and Bryan (2001). Using a employer-employee sample of workplaces covered by a wage agreement, they do not find significant differences in wages between members and non-members of a union.

It seems curious that, so far, the results for the recognition premium are so diverse. However, assuming existence of a recognition premium, the presence of spill-overs between unionised and non-unionised establishments might explain why it is difficult to identify it in empirical work. For example, if in determining wages, non-unionised firms follow unionised firms we do not observe systematic wage differences between workers in unionised and non-unionised environments, and, as a result, there is no recognition premium.

Economic theory offers different explanations for the impact of union wage bargaining on non-union wages. First, threat effects of unionisation might induce non-union employers to increase the non-union wage to avoid unionisation of their workers (see Rosen (1969), Pencavel (1991), Freeman and Medoff (1983)). Second, an increase in the union wage might lead union workers to move into the non-union sector because they prefer non-union jobs above unemployment. The increased supply of workers in the non-union sector leads to a decrease in the non-union wage (Johnson and Mieszkowski (1970)). Third, a union wage increase might lead to increased substitution towards non-union products by consumers. As a consequence, non-union labour demand increases which leads to a higher non-union wage if labour supply of non-union workers is imperfectly elastic (Hirsch and Addison (1986), p119). Fourth, Freeman and Medoff (1981) argue that trade unions are active in environments with low labour demand elasticities. In such conditions, a trade union can press harder

[4]For 1998 only 2% of the workplaces have a closed shop arrangement and in 21% of the workplaces employees received a strong recommendation for union membership. Figures for 1990 are 8% and 34% respectively.

for a wage increase, as there is a lower risk of employment loss.[5]

This paper provides evidence for the hypothesis that the wage premium union members earn in comparison to nonunion workers is mainly a recognition premium instead of a membership premium. The data used for the analysis are from the British Household Panel Survey (BHPS). Our result is obtained by using a more efficient panel data estimator than in previous studies. We also estimated union wage premia that take into account the impact of unionisation. These estimates support our main result.

In what follows the next section outlines the empirical model. Section three describes the data. The fourth section presents and interprets the estimates of the membership premium and the recognition premium. Section five presents estimates of the effect of unionisation on both premia and a discussion. Section six concludes.

2 Empirical Model

In this section we present the empirical model we use to explain wages of union and non-union workers. The British system of industrial relations is such that four types of union status can be assigned to workers. In Great Britain, workers can be a member or a non-member of a union, while their employer is free to decide on recognising a union for the purpose of bargaining. Hence, we can divide the British workforce in four groups. First, we have workers who are a member of a union that is recognised by the employer. Second, we have workers who are not a member of a union that is recognised by their employer. Third, there are workers who are a member of a union but their employer did not recognise a union. Last, there are workers who are not a member of a union and whose employer did not recognise a union. Instead of *a priori* assuming that all

[5]The trade union reduces substitution possibilities of the employer with respect to input factors other than union labour. Marshall's derived demand rules then imply a lower union labour demand elasticity. For the same reason, unions have a higher probability of survival in environments with a low labour demand elasticity. Freeman and Medoff (1981) provide empirical support by presenting evidence of a positive correlation between the percentage of union organisation and union wage premia. The percentage of union organisation is a proxy for substitution, since a high percentage of unionised workers in a sector reduces substitution possibilities for employers.

workers in workplaces without a recognised union earn the same wage, we allow for the possibility that members and non-members within such workplaces can earn different wages.[6] As a consequence, a worker in Great Britain is assumed to earn one of the four following types of wages depending upon the category a worker locates himself into:

$$w^r_{u,it} = \alpha^r_u + \beta^r_u x_{it} + v^r_{u,it} \quad (1)$$

$$w^r_{n,it} = \alpha^r_n + \beta^r_n x_{it} + v^r_{n,it} \quad (2)$$

$$w^{nr}_{u,it} = \alpha^{nr}_u + \beta^{nr}_u x_{it} + v^{nr}_{u,it} \quad (3)$$

$$w^{nr}_{n,it} = \alpha^{nr}_n + \beta^{nr}_n x_{it} + v^{nr}_{n,it} \quad (4)$$

Here, subscript i denotes workers while subscript t denotes periods. Further, u denotes union members, n denotes non-membership, r denotes recognition of a union present in the workplace and nr refers to the absence of a recognised union in the workplace of worker i. For each type of worker, the wage equals the sum of an intercept α^s_m and a linear function of individual characteristics x_{it} with corresponding coefficients β^s_m and a mean zero random error term $v^s_{m,it}$ ($s \in \{r, nr\}$, $m \in \{u, n\}$). Equation (1) describes the wage a worker earns if he has a job in a workplace with a recognised union and is a union member. Equation (2) describes the wage a worker earns if he has a job in a workplace with a recognised union but is not a member. Similarly, equation (3) is the wage a worker earns if he has a job in a workplace without a recognised union and is a member of a union. Finally, equation (4) refers to a worker who has a job in a workplace where no union is recognised, and who is not a member of a union.

If we use an indicator r_{it} to denote recognition (1) or not (0) and, similarly defined, the membership indicator u_{it}, the observed wage is given by:

$$w_{it} = \gamma_0 + \gamma_1 r_{it} u_{it} + \gamma_2 r_{it}(1 - u_{it}) + \gamma_3 u_{it}(1 - r_{it}) + \beta x_{it} + v_{it} \quad (5)$$

[6] The third category of workers is typically small compared to the other categories. This is the reason why in empirical work the latter two categories are usually combined into one category of workers.

where $\gamma_0 = \alpha_n^{nr}$, $\gamma_1 = (\alpha_u^r - \alpha_n^{nr})$, $\gamma_2 = (\alpha_n^r - \alpha_n^{nr})$ and $\gamma_3 = (\alpha_n^r - \alpha_u^{nr})$. The effect of individual characteristics upon a person's wage is assumed to be equal to β for all four types of wages. Unless we are willing to assume that union status is determined exogenously, v_{it} generally has a conditional mean that is unequal to zero.[7] As such, OLS estimates based on (5) will be inconsistent.

To obtain consistent estimates we will use an instrumental variable approach. We assume that the endogeneity of union status enters the wage equation in a time-invariant way by assuming that the conditional mean of v_{it} given z_i^* is constant over time and different for each worker. Here, z_i^* is a subset of all regressors in all time periods. We denote this conditional mean by η_i. Given this assumption, our first model is given by the following equation:[8]

$$w_{it} = \gamma_0 + \gamma_1 r_{it} u_{it} + \gamma_2 r_{it}(1 - u_{it}) + \gamma_3 u_{it}(1 - r_{it}) + \beta x_{it} + \eta_i + \zeta_{it}, \qquad (6)$$

where η_i equals $E(v_{it}|z_i^*)$ and is orthogonal to the error term ζ_{it}. Note that all regressors which are not included in z_i^* are valid (internal) instruments. This is in contrast to the within-group estimator which assumes that all regressors in each period are potentially correlated with the unobserved fixed effect η_i.

3 Data

The data used for our analysis are obtained from the British Household Panel Survey. Only information is used from those waves that contain information on union status for all individuals. Our sample covers the period 1995-1997 and is unbalanced over time. The reason for including only for these years observations is that for 1992-1994 information on union status is only available for individuals who changed jobs.[9] In addition, rather than using a sample of

[7] Note that:

$$v_{it} = v_{n,it}^{nr} + r_{it}u_{it}(v_{u,it}^{r}\text{-}v_{n,it}^{nr}) + r_{it}(1 - u_{it})$$
$$(v_{n,it}^{r}\text{-}v_{n,it}^{nr}) + (1 - r_{it})u_{it}(v_{u,it}^{nr}\text{-}v_{n,it}^{nr})$$

[8] See Robinson (1989) for a discussion on fixed effect specifications in the context of union wages.

[9] For these years there is information on membership available for all workers in the Values and Opinions Section of the BHPS. However, this section does not provide information on union recognition.

manual male workers or females, our sample includes all workers. We think this is important for estimation of the recognition premium as the employer decides on recognition of a union. Unless the criterion that selects the subsample is independent of employer behaviour, the recognition premium needs to be interpreted conditional on the choice of the subsample. Since it is not clear what group of employers will be selected if only male or female workers are included, we prefer to work with both types of gender in our sample.

In our sample we observe 775 workers for two consecutive periods, while 1580 workers are observed for each of the three years.[10] Table 1 shows the distribution of workers over the four union categories. Over the whole period 37.6% of the workers in the sample are member of a recognised union. A proportion of 17.6% of the workers is working in a workplace with a recognised union, but did not join the union as a member. The largest proportion (43.6%) of workers works in a workplace without a recognised union and is not a member of a union. The smallest proportion (2.0%) of workers consists of members of a union that is not recognised in their workplace. The differences between the three years are small. The distribution of workers over union categories is very much in line with that of Blackaby et al. (1999) who present similar figures for the period 1993-1995 using data from the Quarterly Labour Force Survey.

Our dependent variable is log gross hourly wages in 1995 consumer prices.[11] A preliminary analysis of the wage differentials compares average wages between the different union categories. Table 2 shows the unconditional wage differentials of workers compared to non-members in a workplace without a recognised union. Table 2 shows that the unconditional membership premium in our sample is 22.9%, while the unconditional recognition premium equals 9.1%.[12] Members

[10] This sample is drawn from a larger sample of which the criterion was no missing values on any of the variables included in the regression or the dependent variable. This larger sample contains 7819 individual-year observations.

[11] This includes paid overtime which implies paid overtime hours are included to construct the hourly wage. The CPI-index for the UK is used as a deflator and obtained from the OECD.

[12] The percentage difference in wages with respect to the reference group is 25.9% and is calculated as exp(0.229)-1. For expositional purposes, we will interpret the differences in logarithmic wages as percentage differences.

of a union that is not recognised in their workplace, however, have the largest unconditional wage differential. Note that this group is very small and shows, for example, that the difference is not significant for 1995. Andrews et al. (1998) suggest to assume that membership does not have an effect on the wage of an individual who works in a workplace without a recognised union. Blackaby et al. (1999) reject this assumption and choose to omit these individuals from the sample as they might be subject to misclassification. We prefer to include members of a trade union that is not recognised in our sample, and to treat them as a separate group. Table 3 shows that these individuals are located in better jobs in comparison to workers in the other union categories. This could explain the high mean wage of this group.

In all regressions, control variables are included to reduce omitted variable bias in the coefficients of interest. These are: industrial sector (10), job occupation (9), region (18), full-time, female, married, health, head of household, age, holder of qualification, firm size (4), manual worker, public sector , had training last year, job tenure and job tenure squared, time-dummies, and age at the time of completing education. Summary statistics of the regressors are given in Table 4. As our main interest is in union wage differentials we will focus on the coefficients of the union variables in the presentation.

4 Union Premia Estimates

In this section, we present our union premia estimates based on equation (6). The results are shown in Table 5. Three different estimators are used. The first column in Table 5 shows the pooled OLS results. They indicate that workers who are a member of a recognised union earn about 12% more than non-union workers. For non-members in a workplace with a recognised union an estimated wage difference of 3.5% with non-union workers is obtained, although it is not very precise. For members of a union that is not recognised, no significant estimate is obtained. These results suggest that more than half of the obtained unconditional wage differential for members can be explained by the control

variables. The same applies to the non-members in a workplace with a recognised union present. Our pooled OLS estimate for recognised members is close to the 10.5% obtained by Hildreth (2000) for male manual workers. Blackaby et al. (1999) report comparable estimates of 10.0% and 10.4% for manual male workers and female workers, respectively. Regarding recognised non-members, Hildreth (2000) obtains a pooled OLS estimate of 3.6%, while Blackaby et al. (1999) obtain estimates of 4.0% and 7.4% for manual male respectively manual female workers. Our pooled OLS estimates indicate a membership premium of 8.7%, which is in line with the average estimated union wage gap from cross-section models of 8% for Great Britain (see Booth (1995), p180).

In order to account for potential unobserved time-invariant individual heterogeneity the within group estimator is employed. Essentially, it assumes that the union status variables and all control variables are potentially correlated in a time-invariant way with the unobserved individual effect. The results for this estimator are given in the second column of Table 5. In comparison with the pooled OLS estimates the estimated coefficients are much smaller. For none of the three union status variables a significant estimate is obtained. Apparently, the variation over time of our main variables of interest is not sufficient to obtain precise within-group-estimates of union wage premia. We therefore follow Arellano and Bover (1995) and turn to a more efficient system estimator which is in the spirit of Hausman and Taylor (1981). This estimator uses internal instruments that are assumed to be uncorrelated with the unobserved individual effect. It is called system estimator as we estimate a system of equations that consists of two parts. Our first part consists of two first-differenced equations since we have three periods of observations are available. Our second part consists of a level equation in time-means of our original equation of interest. The advantage of this approach as compared to the within group estimator, is that it exploits additional information contained in the level equation. Therefore, more efficient estimates are obtained than on the basis of the within group estimator. For our system of differenced equations, all variables can be used as instruments as the unobserved individual effect is eliminated. For our level equation, time-

means of variables not correlated with the individual effect can serve as internal instruments for the endogenous variables.

For the system-estimates presented in Table 5 female, head of household, age, married, health, sectoral dummies, tenure and tenure squared, and the regional dummies are used as instruments for the level equation. The time-means of these instrumental variables are used as internal instruments for the level equation. For the system of differenced equations, all exogenous variables of each period could potentially be used as instruments. To allow for possible feedback of unobserved components of the differenced equation on future values of included regressors, we treat all regressors as predetermined. In order to test for the specification of the model, two tests have been conducted. These are a Sargan-over-identifying restrictions test for the validity of all instruments, and a test for correlation between the unobserved effect and instruments used for the level equation.[13] We arrived at the specification in Table 5 after testing several sets of instruments.

Column (3) in Table 5 shows that union members earn 4.2% more than non-union workers. This is about one third of the estimate obtained by the pooled OLS and more than twice the estimate of the within group estimator. The estimate obtained for non-members is similar to that of the pooled OLS estimator. Their wages are estimated 3.3% higher than non-union workers. The membership wage premium is equal to the difference between the coefficients of union members and non-union members. The resulting estimate is 0.9% with a standard error of 1.7%. It suggests that no significant wage difference exists between members and non-members in a workplace with a recognised union.[14] The coefficient for non-members suggests a recognition premium of 3.3%. As such our system estimate of the membership premium is smaller than the recognition wage premium. This suggests that not only union members in

[13] See Arellano (1993) for testing mean independence between individual unobserved effects and a set of instruments.

[14] While these estimates are not very precise (significant at a level of 10%) one notes that more precise estimates of the coefficients are obtained in comparison to the within-group estimator.

workplaces with a recognised union benefit from wage provisions. Apparently, it cannot be excluded that non-members in some workplaces benefit as well from union wage bargains. To further explore this issue, we estimate a model with recognition and non-recognised members included as union variables. We would expect a coefficient between 0.033 and 0.042 for the recognition dummy. Column four of Table 5 shows that this is indeed the case. The estimated coefficient of recognition equals 0.041. Moreover, it is more precise (significant at a level of 5%) than the coefficients of recognised members and recognised non-members in column three. Hence, our estimates suggest that there is a recognition premium of about 4% while the membership premium is very small.

In contrast with our finding of wage premium of 4.2% for members of a recognised union in comparison to workers in a workplace where no union was recognised, Hildreth (2000) reports an unrealistically high wage premium of 36.1%. No robust estimate was obtained by him for non-members. The sample used by Hildreth (2000) covered the period 1991-1994 and comprised full-time workers in the private sector. In his analysis he corrected for measurement error, since for the second, third and fourth wave, union status variables are only available for individuals who recently changed job. His approach is different from ours in that he used external instruments for first-differenced wage equations.[15] The high estimate for recognised members suggests that the chosen instrument set does not correct completely for the endogeneity of union status.

So far, mixed results have been found for the wage differential of non-members in a recognised workplace relative to non-members in a workplace where no union is recognised. In the next section, we analyse the extent to which the recognition premium earned by non-members in a workplace with a recognised union, is affected by the degree of unionisation across jobs and sectors.

[15] For union members he used lagged increase-in-union-dues-indicators while lagged employer-pension-scheme-provision-indicators were used as instruments for nonmembers. The indicators indicate an increase in mean union dues where means are taken over age/regional/socio-economic groups. They are constructed using data from the Family Expenditure Survey (FES).

5 Impact of Unionisation

In this section, we will explore the impact of unionisation on union wage premia. Equation (6) is restrictive in assuming that for two comparable groups of workers, the benefits from membership of a recognised trade union are the same, irrespective of the fractions of union members within the two groups. For example, if worker A and worker B have the same profession and work in the same industrial sector, their working environments can still be very different in terms of unionisation. Therefore, a more natural specification seems one in which gains of union status are a function of the degree of unionisation. We denote by O_{it} the degree of unionisation in the sector where worker i is employed in period t. Hence, we propose a specification in which the estimated coefficients on union status depend on unionisation O_{it}. In particular, we assume:

$$\gamma_{j,it} = f_j(O_{it}, \delta) \qquad j = 0, 1, 2, 3, \tag{7}$$

where f_j is some parametric function that describes the relation between the relative gain of union status j and the degree of unionisation O_{it}. Note that now the gains of union status are time-varying and individual specific in that it matters in which environment an individual works. One could choose a linear specification for f_j which is still restrictive, since it assumes that the marginal return of the degree of unionisation is independent of the level of unionisation. Intuitively, a minimum amount of members is needed for a union to be effective.[16] We employ a more flexible piece-wise approach based on the empirical distribution of unionisation O_{it}. We denote by o_{it} the rank order of the sector in which worker i works in period t in terms of unionisation. We model the rank order as the empirical cumulative distribution function F_t of unionisation O_{it} in period t, that is

$$o_{it} = F_t(O_{it}). \tag{8}$$

[16] Indeed this is one of the basic assumptions made in models of endogenous membership. See Booth (1995) for a discussion and references with respect to this literature.

Next, we construct indicator functions to distinguish between low and high unionized environments. This allows us to compare union wage differentials between low unionized environments with high unionized environments. The indicator $d_{q,it}$ denotes whether the environment in which worker i works in period t belongs to the q^{th} order class or not. If $I(.)$ denotes the indicator function, $d_{q,it}$ is given by:

$$\begin{aligned} d_{1,it} &= I(o_{it} \leq \frac{1}{Q}) \\ d_{q,it} &= I(\frac{q-1}{Q} < o_{it} \leq \frac{q}{Q}) \qquad q = 2, ..., Q-1 \\ d_{Q,it} &= I(\frac{Q-1}{Q} < o_{it}) \end{aligned} \tag{9}$$

Essentially, (9) breaks the empirical cumulative distribution function of unionisation into Q quantiles. With (9), our second model follows and is given by:[17]

$$\begin{aligned} w_{it} &= \mu + \left(\sum_{q=2}^{Q} \delta_{0q} d_{q,it}\right) + \left(\sum_{q=1}^{Q} \delta_{1q} d_{q,it}\right) r_{it} u_{it} + \\ &\quad \left(\sum_{q=1}^{Q} \delta_{2q} d_{q,it}\right) r_{it}(1-u_{it}) + \left(\sum_{q=1}^{Q} \delta_{3q} d_{q,it}\right) u_{it}(1-r_{it}) \\ &\quad + \beta x_{it} + \kappa_i + \lambda_{it} \end{aligned} \tag{10}$$

In (10), $\mu = \delta_{01}$ such that the reference group consists of workers who are not members of a union and work in workplaces without a recognised union present. In addition, the sector they work in belongs to the lowest quantile in terms of the degree of unionisation.

For our estimations, we use three different measures of unionisation which are defined with respect to occupation-industry cells. The first measure O_1

[17] Equation (10) follows in a similar way as equation (5). Here $\kappa_i = E(\xi_{it}|z_i^*)$, λ_{it} is orthogonal to κ_i and ξ_{it} is given by:

$$\begin{aligned} \xi_{it} &= v_{it} + r_{it}u_{it}e_{1,it} + r_{it}(1-u_{it})e_{2,it} \\ &\quad u_{it}(1-r_{it})e_{3,it} + (1-u_{it})(1-r_{it})e_{0,it} \end{aligned}$$

Note that the time-varying coefficients of union status depend on unionization through the empirical cumulative distribution function:

$$\gamma_{j,it} = \sum_{q=1}^{Q} \delta_{jq} d_{q,it}, \qquad j = 0, 1, 2, 3$$

is defined as the number of members divided by the total number of workers. Comparable to Freeman and Medoff (1981), we attach to this measure the interpretation that for an employer an increase in O_1 reduces possibilities of substitution of other workers for union members. These other workers can be non-members or non-union workers. The second measure, O_2, is defined as the number of members divided by the total number of workers in workplaces where a union is recognised. Here, an increase in O_2 can be associated with a decrease in substitution possibilities of non-members for members for an employer who recognised a union. The third measure, O_3, is the number of workers in workplaces where a union is recognised divided by total number of workers. An increase in O_3 implies reduced substitution possibilities of members and non-members for non-union workers.[18] The three measures are related with each other, in that O_1 equals the product of O_2 and O_3. Measure O_3 can be thought of as the between workplace component of unionisation and O_2 as the within component of unionisation. It should be stressed that all three measures are defined with respect to occupation-industry cells for each year of the period 1995-1997. The descriptive statistics for each measure are given in Tables 6 and 7. One can infer from Table 6 that the distribution of each measure is fairly stable over time. Table 7 shows, perhaps surprisingly, that the distribution of union categories across workers is quite similar for the three different measures.

A priori, our measures of unionisation can be expected to represent a certain degree of bargaining power of the union. The reason is that, for our sample period (1995-1997), unions could restrict membership to workers only on the basis of profession, industrial sector and region.[19] As two out of three restrictions on

[18] For measures one and three division is by total workers in a cell less the number of members of a union that is not recognized. The reason is that this group of members seems to be a selective group of workers hence we chose to account for that in our measures of union organization.

[19] As stated by the Trade Union Reform and Employment Rights Act 1993 (c. 19) (section on right to membership of trade union):

A requirement in relation to membership of a union is ¨enforceable [...] if it restricts membership solely by reference to one or more of the following criteria-

(a) employment in a specified trade, industry or profession,

(b) occupational description (including grade, level or category of appointment), and

(c) possession of specified trade, industrial or professional qualifications or work experience.

membership define the cells we constructed, our measures can be associated with bargaining power.[20] Our intention is to analyse whether the estimated wage differential for non-members in workplaces with a recognised union is an average effect of workplaces with different degrees of unionisation. For our regressions, we use three quantile indicators.

Table 8 shows the system estimates for our second model given in (10). We did not interact non-recognised members with unionisation as it concerns a very small group of individuals. The table reads as follows. Low refers to a lowly unionised environment while high refers to a highly unionised environment. Medium refers to an environment with an intermediate degree of unionisation. All union coefficients represent effects relative to non-members who work in an environment of low degree of union organisation and without a recognised union present. For example, the coefficient high (δ_{13}) for members of a recognised union indicates the expected wage differential between a worker with this union status in a highly unionised environment an a comparable non-members in a low union organisation environment without a recognised union present. The difference $\delta_{23} - \delta_{03}$ is the recognition wage premium in a highly unionised environment, while the difference $\delta_{13} - \delta_{23}$ is the membership wage premium in a highly unionised environment.

Table 9 presents the estimated membership and recognition premia that follow from 8. For the first measure, we obtain a significant recognition premium of 5.3% and a negative membership premium of -4.3% (significant at 10%) in a low unionisation environment. These results suggest that in low unionisation environments, non-members earn a wage premium of 5.3% with respect to non-union workers. Members in low unionisation environments earn 4.3% *less* than non-members in workplaces with a recognised union. These results are

[20] Ideally all three components are used for constructing our measure. The reason for not including region is to avoid measurement error which is more likely at a higher level of disaggregation. In our data we have nine categories for profession, ten for industrial sectors and nineteen for regions. Hence 1710 different cells could be constructed. For the construction of our measure 10162 observations are used over three periods. Assuming an equal distribution of cells over workers and years this would leave on average (10162/3)/1710=2 workers per cell to construct our measure for. With our current stratification we have on average 38 workers per cell.

intuitive as we would expect that non-members in workplaces with a recognised union cannot gain by becoming a member. However, recall that a low value of our first measure of unionisation can arise because workers do not choose to become a member of a recognised union, or because there are no recognised unions in an occupation-industry cell. The second measure of union organisation is low only if workers do not choose to become a member. The estimated wage premia are in the second column of Table 9. For the second measure, we note a recognition premium of 4.3% and 3.7% (significant at 10%) for low and medium unionisation environments, respectively. This supports the hypothesis that important recognition effects on wages exists. Moreover, in high unionisation environments we estimate a membership premium of 4.7%, although not very precise (significant at 10%). This suggests that only in environments with a recognised union and a large fraction of union members among workers, a membership premium can be earned. In environments with a recognised union, and an intermediate or low fraction of members among the workers, the workers seem to earn a recognition premium rather than a membership premium. This recognition premium is estimated around 4%. Before, we also obtained a recognition premium of this size, but we did not distinguish between different degrees of unionisation (see Table 5). Finally, the third measure of unionisation indicates a low level of unionisation if a small fraction of workers works in a workplace with a recognised union. The third column of Table 9 shows significant recognition premia of 5.6% and 4.3% (significant at 10%) for environments with low and medium degree of unionisation, respectively. We do not obtain significant estimates of the membership premia, which stresses the importance of recognition rather than membership in obtaining a union wage premium.

We would like to discuss two important issues related to union wage differentials within the context of our estimates. The first issue is that of free-riding behaviour by non-members. Non-members could be free-riders if they benefit from what is provided by the union without paying union dues. How do our estimates relate to the free-rider hypothesis ? The estimates in the second column of Table 9 suggest that there is a membership premium in environments

with a high fraction of union members among the workers, while workers earn a recognition premium in environments with a low or intermediate degree of unionisation. This suggests that in environments where the majority is not a member, only a recognition premium can be earned. Similarly, the estimates suggest that only in environments where the majority is a member of the recognised union, a membership premium can be earned. Hence, our results do not suggest that union power is eroded by a large amount of free-riders. Booth and Bryan (2001) use employer-employee data from the 1998 Workplace Employee Relations Survey, which allows to test for free-rider hypothesis directly. They do not find wage differences between members and non-members who are covered by a wage agreement. In their analysis, they control for unobserved workplace heterogeneity, whereas we control for unobserved *worker* heterogeneity.[21]

The second issue is whether the recognition premium is not simply a compensating wage differentials for non-members. We think this is not a correct interpretation of our results. While members are likely to receive non-pecuniary benefits to which non-members are not entitled, the recognition premium is not a compensating wage differential, since it measures the wage premium in comparison to non-members in a workplace without a recognised union. In addition, if the recognition premium is a compensating wage differential, we would expect to see significant recognition premia in high unionisation environments, because non-union workers are more likely to demand compensation in workplaces with a strong rather than a weak union presence.

In sum, our empirical evidence points to recognition being the main driving factor for a wage premium rather than individual membership. In addition to the paper by Booth and Bryan (2001), our results also find support by survey evidence in Millward et al. (2000). They report that in 1998 about 70% of all workers in recognised workplaces were covered by collective bargaining.[22] If

[21] Another important difference with their analysis is that in our sample, workers in workplaces without a recognised union are present. This allows us to investigate whether there is still a union wage premium given that there are no differences between members and non-members within workplaces with a recognised union.

[22] Our sample spans the period 1995-1997. Disney, Gosling and Machin (1996) argue that the recognition decision is a long term decision made near the start-up data of an establish-

this figure relates also to collective wage bargaining, it suggests membership is mainly for other reasons than wages. Other supporting evidence is Hildreth (2000) who did not find differences between members and non-members in satisfaction with their wage.

ment. Recognition can therefore be considered a persistent phenomenon hence justifying a comparison with the figures of Millward et al. (1998)

6 Conclusion

Recent evidence suggests that during the nineties no wage differences existed in Great Britain between members and non-members within recognised workplaces (Booth and Bryan (2001), Millward et al. (2000), Hildreth (2000)). This paper presents panel data estimates of union wage differentials for Great Britain for the period 1995-1997. Our results support the hypothesis that the wage premium members receive above non-union workers is due to recognition, rather than individual membership. As such, we provide evidence that the recent findings are also true in case one corrects for unobserved worker heterogeneity. Moreover, our estimates indicate that the recognition premium is about 4% in size.

Our analysis also suggests that if the majority of workers are member of the recognised union, there is a membership premium to earn in addition to the recognition premium. We have argued that our results are not likely to reflect compensating wage differentials for non-members, nor do they suggest that union power is eroded by free-riding behaviour among non-members in workplaces with a recognised union.

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Appendix

Table 1: **Distribution over union categories**

	1995	1996	1997	All
recognised member	734 (0.378)	868 (0.369)	760 (0.382)	2362 (0.376)
recognised non-member	320 (0.165)	416 (0.176)	328 (0.165)	1064 (0.169)
not recognised non-member	852 (0.438)	1028 (0.437)	863 (0.433)	2743 (0.436)
not recognised member	37 (0.019)	43 (0.018)	41 (0.020)	121 (0.019)
Total	1943	2355	1992	6290

Note: percentages are given in brackets.

Table 2: **Unconditional Wage Differentials**

	1995	1996	1997	All
recognised member	0.227 (0.026)	0.234 (0.024)	0.224 (0.027)	0.229 (0.015)
recognised non-member	0.083 (0.035)	0.095 (0.031)	0.096 (0.034)	0.091 (0.019)
not recognised member	0.238 (0.133)	0.390 (0.102)	0.296 (0.094)	0.312 (0.063)
Total	1943	2355	1992	6290

Note: The figures are differences in log real hourly wages with respect the wage of non-members in workplaces without a recognised union. Standard errors are given in brackets.

Table 3: **Occupational distribution by union category**

	recognised member	recognised non-member
managers and administrators	0.098	0.137
professional occupations	0.170	0.120
associate professional or technical	0.136	0.128
clerical/secretarial	0.164	0.249
craft	0.101	0.070
personal/protective services	0.120	0.131
sales	0.028	0.043
plant/machine operatives	0.108	0.058
other	0.075	0.065
Total	2362	1064

	not recognised member	not recognised non-member
managers and administrators	0.165	0.207
professional occupations	0.256	0.079
associate professional or technical	0.182	0.088
clerical/secretarial	0.033	0.197
craft	0.116	0.108
personal/protective services	0.025	0.083
sales	0.025	0.100
plant/machine operatives	0.165	0.080
other	0.033	0.059
Total	121	2743

Note: Jobs are classified according to the 1-digit Standard Occupational Classicication (SOC).

Table 4: **Descriptive statistics**

Variable	**mean**	**Variable**	**mean**
log wage (hourly)	1.919 (0.548)	other manufacturing industries	0.093
recognised member	0.375	construction	0.023
recognised nonmember	0.169	distribution, hotels, catering	0.163
nonrecognised member	0.019	transport and communication	0.063
nonunion worker	0.436	banking, finance, insurance	
female	0.516	business services and leasing	0.133
fulltime	0.758	other services	0.361
hhh	0.529	Inner London	0.030
age	39.990 (10.54)	Outer London	0.068
married	0.780	Region of South East	0.204
health	0.035	South West	0.091
age at completion education	18.162 (4.465)	East Anglia	0.042
noqualif	0.141	East Midlands	0.077
manual	0.283	West Midlands Conurb	0.027
public	0.318	Region of West Midlands	0.060
training	0.400	Greater Manchester	0.035
tenure	5.560 (5.856)	Merseyside	0.020
managers and administrators	0.154	Region of North West	0.041
professional occupations	0.123	South Yorkshire	0.029
associate professional or		West Yorkshire	0.030
technical	0.114	Region of Yorks and Huvber	0.036
clerical/secretarial	0.190	Tyne and Wear	0.021
craft	0.100	Region of North	0.051
personal/protective services	0.104	Wales	0.054
sales	0.061	Scotland	0.084
plant/machine operatives	0.088	firm size (-25)	0.317
other	0.066	firm size (25-99)	0.258
agriculture,forestry		firm size (100-499)	0.247
and fishing	0.011	firm size ($\leq$ 500)	0.178
energy and water supplies	0.021		
chemical	0.032		
metal goods, engineering			
and vechicles industries	0.098		
observations	6290		

Notes
1) standard deviations are given in brackets for non-dummy variables.

Table 5: **Union status estimates**

	(1) OLS	(2) WG	(3) SYS	(4) SYS
r_{it}				0.041^{*}
				(0.019)
$r_{it}u_{it}$ (γ_1)	0.123^{*}	0.019	0.042^{**}	-
	(0.019)	(0.025)	(0.023)	
$r_{it}(1-u_{it})$ (γ_2)	0.035^{**}	0.017	0.033^{**}	-
	(0.020)	(0.019)	(0.019)	
$u_{it}(1-r_{it})$ (γ_3)	0.062	-0.054	-0.031	-0.031
	(0.055)	(0.054)	(0.038)	(0.038)
Sargan test			136.3 (117)	130.9 (113)
Correlation test			34.9 (32)	32.0 (32)
NT	6290	3935	6290	6290

i) The dependent variable is log deflated hourly real wages. Heteroskedasticity and autocorrelation robust standard errors are given in parenthesis. Asterisks denote significance levels of 5 % (*) or 10 % (**).
ii) Pooled OLS results are in column (1). Column (2) shows the within group estimator results. Columns (3) and (4)show results for the system estimator.
iii) Instruments used for the system in differenced equations are current values of full-time, head of household, married, eduage, noqualif, public, training, occupational dummies (8), sectoral dummies (9) and regional dummies (17). All current and lagged values are included for recognised members and non-members, non-recognised member, age, health, manual, firm size dummies (3) and tenure (2).
iv) The instruments used for the level equation are female and the time-means of head of household, age, married, health, sectoral dummies (9), tenure (2) and regional dummies (17).
v) The correlation test tests for correlation of the instruments used for the level equation and the unobserved time-invariant effect. This is a Hausman type Wald test as described in Arellano (1993).

Table 6: **Descriptives union organisation measures**

Measure		Mean	St. dev.	quantile 1	quantile 2	quantile 3
O_1	1995	0.336	0.217	(0, 0.20)	(0.20, 0.40)	(0.40, 1)
	1996	0.336	0.212	(0, 0.17)	(0.20, 0.41)	(0.41, 1)
	1997	0.320	0.211	(0, 0.20)	(0.20, 0.40)	(0.40, 1)
O_2	1995	0.604	0.191	(0, 0.56)	(0.56, 0.69)	(0.69, 1)
	1996	0.612	0.168	(0, 0.53)	(0.53, 0.69)	(0.69, 1)
	1997	0.584	0.197	(0, 0.55)	(0.53, 0.65)	(0.65, 1)
O_3	1995	0.509	0.253	(0, 0.34)	(0.34, 0.61)	(0.61, 1)
	1996	0.512	0.248	(0, 0.36)	(0.36, 0.65)	(0.65, 1)
	1997	0.500	0.245	(0, 0.34)	(0.34, 0.63)	(0.63, 1)

Measures of union organisation are defined in text.

Table 7: **Distribution union categories - unionisation classes**

	recognised member	recognised non-member	non-recognised member	non-recognised non-member	Total
O_1					
low	0.039	0.038	0.006	0.234	0.317
medium	0.129	0.068	0.003	0.146	0.346
high	0.208	0.063	0.010	0.056	0.337
O_2					
low	0.055	0.058	0.005	0.198	0.316
medium	0.124	0.063	0.005	0.147	0.339
high	0.196	0.048	0.010	0.084	0.338
O_3					
low	0.041	0.034	0.006	0.236	0.317
medium	0.135	0.066	0.004	0.153	0.358
high	0.199	0.069	0.009	0.048	0.325

i) Measures of union organisation are defined in text.
ii) Numbers are percentages over whole sample of 6290 observations.

Table 8: **System estimates - degree of unionisation**

	O_1 (1) SYS	O_2 (2) SYS	O_3 (3) SYS
not recognised non-member			
medium (δ_{02})	−0.026	−0.019	−0.016
	(0.020)	(0.014)	(0.019)
high (δ_{03})	−0.040	−0.005	−0.014
	(0.027)	(0.018)	(0.036)
recognised member			
low (δ_{11})	0.010	0.038	0.034
	(0.027)	(0.024)	(0.027)
medium (δ_{12})	0.027	0.027	0.026
	(0.028)	(0.025)	(0.029)
high (δ_{13})	0.018	0.032	0.030
	(0.029)	(0.028)	(0.034)
recognised non-member			
low (δ_{21})	0.053*	0.043*	0.056*
	(0.022)	(0.021)	(0.023)
medium (δ_{22})	0.003	0.018	0.027
	(0.026)	(0.021)	(0.026)
high (δ_{23})	−0.005	−0.015	−0.004
	(0.130)	(0.030)	(0.035)
not recognised member	−0.057	−0.031	−0.041
	(0.038)	(0.037)	(0.039)
Sargan test	169.2(141)	164.7(141)	168.8(141)
Correlation test	44.6(32)	43.2(32)	41.9(32)
NT	6290	6290	6290

i) Measures of union organisation are defined in text.
ii) See notes i), iii)-v) in Table 7.
iii) In addition, all current and lagged values of the union variables are used as instruments for the system of differenced equations.

Table 9: **Union wage premia - degree of unionisation**

	O_1	O_2	O_3
	membership	premium	
low	-0.043^{**}	-0.005	-0.022
	(0.025)	(0.021)	(0.025)
medium	0.024	0.009	-0.001
	(0.021)	(0.020)	(0.022)
high	0.023	0.047^{**}	0.034
	(0.024)	(0.027)	(0.027)
	recognition	premium	
low	0.053^{*}	0.043^{*}	0.056^{*}
	(0.022)	(0.021)	(0.023)
medium	0.029	0.037^{**}	0.043^{**}
	(0.022)	(0.020)	(0.023)
high	0.035	-0.010	0.010
	(0.028)	(0.029)	(0.034)

i) Measures of union organisation are defined in text.
ii) The union wage premia are based on estimates in Table 8.
iii) Low, medium, and high refer to the degree of unionisation in the work environment.
iv) Standard errors are in brackets.